HEAT-INSULATING CONTAINER

BACKGROUND OF THE INVENTION

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Field of the Invention

The present invention relates to a heat-insulating container that is suitable for containing therein instant noodles or any other food blocks that can be served after pouring hot water therein, or containing therein a low-temperature food such as a deep-frozen or chilled food block.

Discussion of the Background

In order to place instant noodles such as dried noodles, snack noodles, miso-soup, or hot coffee or cold beverage in a container, some specific structures are employed to provide heat-insulating capability to the container, thereby providing consumers with protection against burns, or ease hand grasping.

An expanded polystyrene foam or any other types of synthetic resin foam, or injection-molding technique are employed to provide such a heat-insulating container, among which an injection-molded container made of polypropylene is frequently used due to a current social demand to an environmentally benign material. An injection-molded container body of the container is provided with ribs extending vertically along the circumferential wall to prevent heat of hot water poured in the container from transmitting to the fingers of the user grasping the container.

The heat-insulating container of the above type must be light-weight and low-cost. To achieve these, the container may be formed with a thinner wall, thereby reducing the amount of a resin material used. However, the thinner wall of the container poses a problem of deteriorating the strength of the container body.

Particularly, when in contact with hot water, the container itself is softened and easy to deform, resulting in the deterioration in strength of the body.

Accordingly, it is an object of the present invention to provide a heat-insulating container that has an excellent heat-insulating capability and a relatively high strength structure, as well as a light-weight structure.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a heat-insulating food container including an injection-molded container body having a bottom wall, a circumferential wall integrally coupled to a periphery of the bottom wall and upwardly extending therefrom for defining an inner space and an upper open end, and vertical ribs vertically extending along the circumferential wall. The circumferential wall includes circumferential wall parts respectively having different diameters and arranged in such a manner as to form the circumferential wall with the diameter thereof decreasing in a stepwise manner as it advances downwardly, thereby forming corresponding stepped portions on an exterior surface and an interior surface thereof.

With the above arrangement, the container has an excellent heat-insulating capability and a relatively high strength structure. The container with the stepped portion can be made by a relatively small amount of a resin material, resulting in reduced material costs and light-weight structure, in comparison with the container provided with a thicker wall portion for obtaining a sufficient strength.

There may be provided a downwardly-facing subsidiary rib extending along the circumferential wall in the circumferential direction thereof with a predetermined clearance with respect to the circumferential wall. The thus

arranged downwardly-facing subsidiary rib makes a double-layered structure in cooperation with the circumferential wall, so that the container body may be strengthened. In addition, the clearance defined between the downwardly-facing subsidiary rib and the circumferential wall prevents heat caused by hot water poured into the container body from straightly transmitting to the subsidiary rib. Thus, the user can easily grasp the container body with his or her fingers via the subsidiary rib.

BRIEF DESCRIPTION OF THE DRAWINGS

The above, and other objects, features and advantages of the present invention will become apparent from the detailed description thereof in conjunction with the accompanying drawings wherein.

FIG. 1 illustrates a container according to a first embodiment of the present invention with a half part thereof in section.

FIG. 2 is a cross section of an essential portion of the container of FIG. 1.

FIG. 3 illustrates the containers stacked on each other with half parts thereof in section.

FIG. 4 illustrates a container according to a second embodiment of the present invention with a half part thereof in section.

FIG. 5 illustrates a container according to a third embodiment of the present invention with a half part thereof in section.

FIG. 6A is a sectional plan view of an essential portion of the container, illustrating a vertical rib.

FIG. 6B is a sectional bottom view of an essential portion of the container, illustrating a bottom wall of the container body.

FIG. 7 illustrates a container according to a fourth embodiment of the

present invention with a half part thereof in section.

FIG. 8 is a sectional plan view of an essential portion of the container, illustrating a vertical rib.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Embodiments of the present invention will hereinafter be described with reference to the accompanying drawings. A container according to the first embodiment of the present invention in FIGS. 1 to 3 is illustrated as that for containing therein an instant or dried noodle block.

A container 1 includes a heat resistant container body 3 made of a plastic material such as polypropylene or high-density polyethylene. It has a bottom wall and a circumferential wall 3a integrally coupled to a periphery of the bottom wall and extending upwardly therefrom for defining an interior space and an upper open end. The container body 3 has a flange 2 around the upper open end, which has a reverse U-shaped cross section. The upper open end of the container body 3 is detachably sealed by a sealing lid (not shown) formed by an aluminum foil layer and a laminate layer such as a synthetic resin film or paper.

lid

The container body 3 is formed by the injection-molding to have its diameter decreasing as it advances towards the lower side. The circumferential wall 3a of the container body 3 is also provided with vertical ribs 7 vertically and continuously extending along the exterior surface of the circumferential wall 3a. The container body 3 has an upper part or larger-diameter part 5 which has a flat surface with no concave or convex area and is formed in a cylindrical shape. The vertical ribs 7 terminate at their upper ends in the larger-diameter part 5 and have surfaces flush with a surface 5a of the larger-diameter part 5.

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The circumferential wall 3a of the container body 3 forms corresponding

stepped portion respectively on an interior surface and an exterior surface thereof. Specifically, the circumferential wall 3a includes a plurality of cylindrical parts integrally coupled to each other in stepwise manner. In this embodiment, two cylindrical parts, namely an upper circumferential wall part 9a and a lower circumferential wall part 9b are formed.

The upper circumferential wall part 9a includes a flared part 11a having a smaller diameter than the larger-diameter part 5 and coupled to the same via a first coupling part 13 in the form of an annular horizontal wall, and a straight part 11b with a substantially uniform diameter extending downwardly from a lower periphery of the flared part 11a ~~11b~~. The straight part 11b has its lower periphery coupled to the upper periphery of the lower circumferential wall part 9b via a second coupling part 10 in the form of an annular horizontal wall. The upper surface of the annular horizontal wall of the first coupling part 13 is provided near the upper open end of the container body 3 to act as an indication line 13a indicating a suitable level of hot water poured in the container body 3 for reconstituting the dried food. The straight part 11b has a lower periphery, along which a downwardly-facing subsidiary rib 14 extends with a clearance 22 defined with respect to the lower circumferential wall part 9b and having each portion thereof between adjacent ones of the vertical ribs 7 having laterally opposite ends respectively coupled to those adjacent vertical ribs 7. The subsidiary rib 14 acts as a reinforcing means in cooperation with the second coupling part 10 for reinforcing the container body 3 against the grasping force of the user and has a lower periphery positioned below the indication line 13a but above the middle portion of the container body 3 between a bottom wall 3b and the upper open end. The reinforcing means is preferably positioned at a height of up to 50 to 70 % from the bottom wall 3b to the upper open end. The vertical ribs 7 project than the subsidiary rib 14, and slant at the same slanting angle as the lower circumferential

wall part 9b to extend substantially in parallel relationship with the same. The downwardly-facing subsidiary rib 14 preferably extends through all the vertical ribs 7. However, the subsidiary rib 14 is not necessarily limited to this. It is possible to partially omit the subsidiary rib 14 at a portion or portions between predetermined adjacent vertical ribs.

A holding rib 15 is formed on the inner circumferential surface of the lower circumferential wall part 9b and below the reinforcing means, which extends in the circumferential direction to hold thereon the vertical ribs 7 or the like of another container stacked on the container 1, as illustrated in FIG. 3. A cylindrical leg part 17 is integrally coupled to a lower surface of the bottom wall 3b.

A tubular label 18 having a heat-shrinkable characteristic is applied on the circumference wall 3a. The label 18 has an inwardly facing surface applied thereon with a heat-sensitive bonding agent that is activated by heat at the time of heat-shrinkage of the label 18 to possess adhesive power. The upper circumferential wall part of the label 18 is bonded to a surface 5a of the larger-diameter part 5 of the container body 3 via the heat-sensitive bonding agent. Accordingly, the label 18, which has a flared shape along the vertical ribs 7, is unlikely to slip downwardly away from the container body 3, and can therefore be held in place. Thus, the label 18 provides printed information with good appearance.

According to the above arrangement, hot water poured in the container 1 heats the circumferential wall 3a which provides a grasping portion of the container body 3 to the user. However, the vertical ribs 7 together act as radiation means of radiating heat transmitting from the circumferential wall 3a so that the radially outer ends or ridge parts of the vertical ribs 7 are heated only to a relatively low temperature, and provide only a small contact area with the fingers of the user. As a result, the user is unlikely to excessively feel hot via his or her

fingers grasping the container 1.

As an additional advantage according to this embodiment of the present invention, even with a relatively strong grasping force, the container body 3 is unlikely to be deformed because of the reinforcing means. The reinforcing means is made up by the second coupling part 10 and the subsidiary rib 14, and formed around the circumferential wall 3a at a middle height of the container body 3, which is a easily deformable part of the container body 3, so that it can provide an improved strength against the force effecting in the diametrical direction as compared with the container having a circumferential wall 3a formed with a flat surface.

A commonly used plastic material, from which the container body 3, the subsidiary rib 14, and the like of the container are formed in this embodiment, may be softened and decrease in stiffness with heat, thereby causing the likelihood of deteriorating the strength of the container body 3. However, the radially outwardly positioned vertical ribs 7 than the subsidiary rib 14 is unlikely to be heated to a high temperature, thereby preventing deterioration in strength of the vertical ribs 7, even if the subsidiary rib 14 along with the container body 3 is heated. The flange 2, which is kept out of direct contact with the hot water is positioned above the indication line 13a, enables the container body 3 to maintain its stiffness even if the hot water is placed therein.

The circumferential wall 3a of the container body 3 also has stepped portions on an interior surface and an exterior surface formed correspondingly to each other. This surface formation contributes to the decrease in thickness of the circumferential wall 3a of the container body 3 without the necessity of providing a thicker portion for reinforcing the container body. Thus, the amount of the synthetic resin material used can be reduced, resulting in reduced material costs and light-weight structure.

As described above, the container body 3 has the vertical ribs 7 extending in slanting relationship with the vertical axis of the container body 3 and the circumferential wall 3a extending in parallel or slanting relationship with the vertical axis of the container body 3, and the subsidiary rib 14 solely provided on the container body 3. The container body 3 having this outer configuration thus has a substantially trapezoidal shape with the bottom side having a smaller diameter, which enables the container body 3 to be easily pulled out from a die in a direction towards the smaller diameter side of the container body 3. The sole arrangement of the subsidiary rib 14 is unlikely to deteriorate smooth removing operation, and also provides a limited number of stepped portions on the interior surface of the container body 3 to prevent a fork,, chopsticks or the like from easily getting caught on such portions, while assuring the necessary strength.

FIG. 4 illustrates the container according to the second embodiment of the present invention, whose container body 3 includes the circumferential wall 3a made up by the upper circumferential wall part 9a and the lower circumferential wall part 9b in the same manner as the first embodiment. The flange 2 is formed solely by the horizontal wall. The larger-diameter part 5 has the lower periphery, along which a downwardly-facing subsidiary rib extends with a predetermined clearance 22 with respect to the flared part 11a of the upper circumferential wall part 9a and has each portion thereof between the adjacent vertical ribs 7 with laterally opposite edges of each portion respectively coupled to these adjacent vertical ribs 7. The subsidiary rib 14a is positioned at a height equal to or closer to the indication line 13a, so that the relatively flat flange 2 can have substantially the same strength as the flange having a reverse U-shaped cross section. Through the flattening of the flange 2, the lid covering the opening of the container body 3 can have an improved productivity for obtaining a sufficient sealing ability, while the flange 2 can have a reduced width. Also, in this embodiment, the heat-

shrinkable label 18 can be applied on the container body 3 in the same manner as the first embodiment.

FIGS. 5 and 6 illustrate a container according to the third embodiment of the present invention. The container of this embodiment is also used to contain therein an instant or dried noodle block as an example of dried foods.

The container 1 includes the cup-shaped container body 3 with the bottom wall. The container body 3 may be made of, for example, polypropylene, high-density polyethylene, polystyrene or any other types of plastic materials, as far as they each have a proper heat-insulating characteristic and heat-resisting characteristic suitable for a food container. Particularly, when using a polypropylene resin such as a propylene-ethylene copolymer, it preferably has a melt index (MI) of 50 to 100, and more preferably 60 to 80.

The upper open end of the container body 3 is provided with the flange 2, and is detachably sealed by a sealing lid (not shown) formed by an aluminum foil layer and a laminate layer such as a synthetic resin film or paper.

The container body 3 is formed by the injection-molding to have its diameter decreasing as it advances towards the lower side. The circumferential wall 3a of the container body 3 is also provided with the vertical ribs 7 vertically and continuously extending along the exterior surface of the circumferential wall 3a. The container body 3 has the upper part or larger-diameter part 5 which has a flat surface with no concave or convex area and is formed in a cylindrical shape. The vertical ribs 7 terminate at their upper ends in the larger-diameter part 5.

The vertical ribs 7 each are formed into a triangular shape or trapezoidal shape with its width narrowing as it advances towards a radially outer end or top part thereof, and are formed so that the width T of the base part of each vertical rib 7 and the thickness t of the circumferential wall 3a of the container body 3 can satisfy the relationship of $t \leqq T \leqq 4t$. Where the container is an instant food

container with the bottom wall 3b whose diameter is 50 to 80mm and a height of 70 to 130 mm, an applicable thickness t of the circumferential wall 3a of the container body 3 is between the lower limit of 0.2 mm, less than which a practical strength cannot be obtained, and the upper limit of 1.0 mm, less than which short shot was conventionally easy to occur during the injection molding. Particularly, it is preferable to use a polypropylene resin with MI of 50 to 100, because the container 1 having a thinner wall thickness, namely t of 0.2 mm to 0.6 mm can be manufactured.

Where the width T of the base part of each vertical rib 7 is smaller than the thickness t of the circumferential wall 3a of the container body 3, flowing passages of the resin used are not formed so that the vertical ribs 7 cannot respectively act as grooves. Accordingly, the molten resin are hard to sufficiently flow along any vertical ribs, so that short shot may easy to occur. Where the width T of the base part of each vertical rib 7 is larger than 4t, the resistance force of the molten resin against the vertical ribs is reduced. This enhances the flow of the molten resin to the vertical ribs 7, but causes insufficient flow of the molten resin into thinner parts between the adjacent vertical ribs 7 on the circumferential wall 3a, which may result in uneven wall thickness of the container body 3 and a higher likelihood of short shot during the injection molding.

On the circumferential wall 3a of the container body 3 between the vertical ribs 7 are successively formed several circumferential wall parts (three circumferential wall parts 9a, 9b and 9c in this embodiment) defining stepped portions.

The circumferential wall parts 9a, 9b and 9c are respectively coupled to the adjacent wall parts via corresponding coupling parts 10. The downwardly-facing subsidiary rib 14a extends along the lower periphery of the upper circumferential wall part 9a with a predetermined clearance 22 with respect to the middle

circumferential wall part 9b, and is formed in the circumferential direction of the container body 3 with each portion between the adjacent vertical ribs 7 having laterally opposite ends respectively coupled to these adjacent vertical ribs 7. A subsidiary rib 14c also extends along the lower periphery of the middle circumferential wall part 9b.

The vertical ribs 7 project than the subsidiary ribs 14b and 14c, and slant at the same slanting angle as the lower circumferential wall part 9b to extend substantially in parallel relationship therewith. In order to enhance the heat-insulating characteristic of the container and reduce the material costs, the height H of each vertical rib 7 with respect to the lower circumferential wall part 9c is preferably in the range of $0.5\ \mathrm{mm} \leqq H \leqq 5\ \mathrm{mm}$, and more preferably in the range of $1.5\ \mathrm{mm} \leqq H \leqq 4\ \mathrm{mm}$.

Likewise to the first embodiment, the cylindrical leg part 17 is provided on the lower portion of the container body 3, and the tubular label 18 having a heat-shrinkability is applied on the circumferential wall 3a.

The container having the above arrangement is manufactured by the injection molding, using a core die having a shape corresponding to the interior surface of the container body 3 and a cavity die having a shape corresponding to the exterior surface of the container body 3. The cavity die forms an injection port at a position corresponding to the center of the bottom wall of the container body 3.

After putting the core die and the cavity die together, the molten resin is poured under pressure through the injection port to form the circumferential wall 3a along with numbers of the vertical ribs 7. Since the molten resin flows at a high pressure, the container body 3 is formed in a moment (e.g., about 0.5 to 1 sec.). In this respect, the width T of the base part of each vertical rib 7 and the thickness t of the circumferential wall 3a of the container body 3 are set based upon the relationship of $t \leqq T \leqq 4t$, so that the molten resin can smoothly flow into distal ends

of the circumferential wall part and the vertical rib parts defined within the cavity. Thus, the container body 3 having a thinner wall can be manufactured with a high formability.

For inject-molding the container for the instant food having the bottom wall 3b of 50 to 80 mm in diameter, the container body 3 of 70 to 130 mm in height, the following conditions are applied:

Injection pressure: 100 to 200 Mpa

Resin temperature (at the time of the injection): 200 to 280℃

Die temperature: 10 to 20 ℃

Even if the circumferential wall 3a providing a grasping portion to the user is heated by such as hot water placed in the heat-insulating container, the vertical ribs produce radiation effect limiting the temperature increase of the ridge parts of the vertical ribs, and provide relatively small contact area with the fingers of the user. As a result, the user can easily grasp the container without feeling the holder portion heated to a relatively high temperature.

Also, even if the container body 3 is held with a relatively large grasping force, the vertical ribs 7 radially projecting from the container body 3 provides an improved strength against the grasping force effecting in the diametrical direction in comparison with the circumferential wall 3a having a flat surface, so that the container body is unlikely to be deformed with such a grasping force. It is common that synthetic resin is somewhat softened and hence reduces its stiffness with heat. However, the subsidiary ribs 14b and 14c are unlikely to be heated with hot water or contents, thereby preventing the deteriorated stiffness of the container body 3.

FIGS. 7 and 8 illustrate the container according to the fourth embodiment of the present invention, in which corresponding or identical parts to those of the second embodiment have been given the same reference characters to omit a detailed description thereof. The difference between this embodiment and the

second embodiment lies in that the container body 3 of this embodiment is not provided with a stepped portion, and therefor has the ridge parts of the vertical ribs 7 extending in parallel relationship with the surface of the circumferential wall 3a of the container body 3 throughout the length of the vertical ribs 7. In this case, the height H of the vertical ribs 7 is preferably set in the range of 1.5 to 4.0 mm.

(Testing Examples)

The testing was conducted to determine the formability for the respective containers of the third and fourth embodiments. Test results will be discussed below.

Under the injection-molding conditions shown in Table 1, the heat-insulating container of the third embodiment was formed by using a propylene-ethylene copolymer having an MI of 80, in which the thickness t of the circumferential wall was 0.25 mm, the width T of the base part of each vertical rib 7 was 0.7 mm, and the height H of each vertical rib 7 was 1.5 mm at a lowest portion and 3.5 mm at a highest portion (Example 1).

Also, under the injection-molding conditions shown in Table 1, the heat-insulating container of the fourth embodiment was formed by using a propylene-ethylene copolymer having an MI of 60, in which the thickness t of the circumferential wall was 0.5 mm, the width T of the base part of each vertical rib 7 was 0.8 mm, and the height H of each vertical rib 7 was 1.9 mm (Example 2).

As a comparative example, the heat-insulating container which was formed in the same manner as the Example 2, except that the width T of the base part of each vertical rib 7 was 0.4 mm, was prepared.

TABLE 1

	Resin temperature (℃)	Injection pressure (Pa)	Cycle time (sec.)	Number of dies used
Example 1	260	137.2 M	9.2	2
Example 2	250	156.8 M	9.1	6

To determine the formability in each example, the occurrence of short shot near the upper open end of each container was visually observed through insufficiently formed portion of the container. A container on which no short shot was observed, was determined as being made with a good formability. No short shot was observed in the Examples 1 and 2, which were therefore determined as being formed with a good formability. On the other hand, short shot was observed in the Comparative Example, which was therefore determined as being formed with a poor formability.

It is to be noted that the present invention is not limited to the first to fourth embodiments as described above. For example, a container of the present invention can be used for containing therein not only dried noodles to be cooked with hot water but also hot coffee or cold drink. The shape of the container body 3 is also not limited to a circular shape in plan. Rather, it may have any shape such as rectangular or elliptical shape.

This specification is by no means intended to restrict the present invention to the preferred embodiments set forth therein. Various modifications to the heat-insulating container of the present invention, as described herein, may be made by those skilled in the art without departing from the spirit and scope of the present invention as defined in the appended claims.